

PCT

1EMKIHABIOPTAHII3A IBB
mn lvr AIM110RCOBTBEm10GTHI"
Mawayaspomere!Cove



iMIEXC YHAPOAFIAH 3AHBKA, OIIYBJI KOBAHHASI B COOTBETCTBH
C ,1{OFOBOPOM 0 IIATEHTHOI KOOIEPAIII3I3 (PCT)

.)Mena yeaportyae arraccsltsa:autwt
sao6pereas:e
A61N15/06

(11) Hoaep rceacpyrrapoga:o6 ay6maanaa: WO 96/25978
AI (43) A^Bra meamyaapopnoti
ay6u@cat ea: 29 army ra 1996 (29.08.96)

1)Homep neagyxaponnott a rnica: PCT/RU95/00211

2) Sara 116:1epyEapOnn0 t uuoAaaa:
27 ceam6pa 1995(27.09.95)

0) jlae se o npnopwrere:
95102749 24 4respaaa 1995(24.02.95) RU

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CZ, BE, DK, ES, FI, GB, HU, JP, I(R, MX, NO, NZ,
PL, PT, RU, SE, SI, US, esponeiicxsdt rtarewr (AT,
BE, CH, BE, DX, ES, FR, GB, GR, IE, IT, LU, MC,
NL, PT, SE).

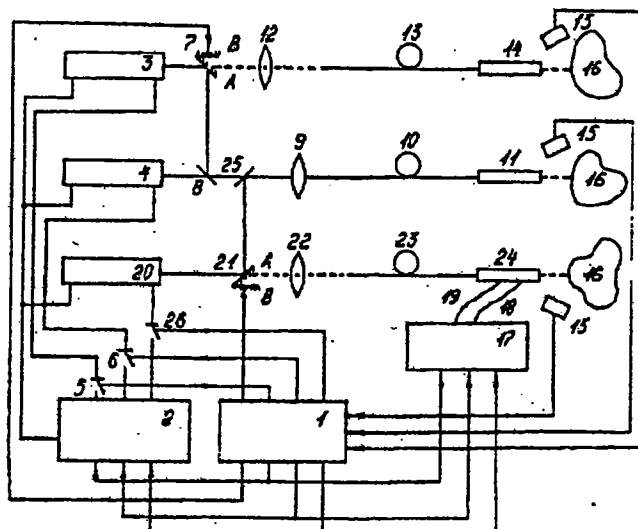
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1X72) 3aaacarem. st aao6perareas: AJIbTIIYJIEP rpao-
pa~ Eapecoaa4 (RU/RU); 96240 Caere-Ile 4p6ypr,
Ilymmscae mocce, A. 6, icopn. 1, xa. 97 (RU) [ALT-
SHULER, Grigory Borisovich, St.Petersburg (RU)].

54) Title; DEVICE FOR USE IN THE LASER TREATMENT OF BIOLOGICAL TISSUE (VARIANTS THEREOF)

i4) Haasaaae a oobpereaaa:YCTPOfCTBO ,ILJla JIA3EPHOla OBPABOTXM BHOJIOTHFIECROf TRAHN (ErO
,APHAHTiID




57) Abstract

The devices, comprising two or three pulser lasers (3, 4, 20), are provided with a system for the automated optimisation of the parameters pertaining to the radiation of the two lasers and to the type and method of-treatment applied to each type of biological tissue. The outputs from at least one receiver (15) for receiving data on the condition of the biological tissue (16) being treated are connected to the inputs of the control unit (1) whose output signals are applied to electronic switches (5, 6, 8) incorporated in the links between each laser (3, 4, 20) and a power supply unit (2). The devices also include a controllable irrigation system (17) for irrigating the treatment zone and a mixing system for mixing the laser beams. The latter system empties reflecting mirrors (7, 21) and selectively reflecting mirrors (8, 25) and makes it possible to produce independent radiation outputs.

В *уCTpOI%CTBa*, **COCTOEI\$HC** *H3 ABTA* NJIH TpCX HMIIynbCHWX na3epOB (3, 4, 20). B\$CAOHa CHCTCMa aBTOMATH'ICCKON OITHMH3auHH napaMeTpOB H311yNCHHS 3THX J a3epDS. TH11Ob H pCZZHMOB o6pa6oTKH AIL9 Kaznom13 BHZa 6HOJ10111¹*ICCKOA TKaHH*. BbIXOA61 XOTli 6u OAHOI'O npHCMHHKa fiHt4OpMaIUHH (15) o COCTOAHHH o6pa6ammauo i 6HOTKaniH (16) COCAHHCHbI C EXOIIUMH 6lnox a ynpaBncHHZ {1}. BWXOIIHWC CHrHaFLI KOTOpOTO Honiara Ha 9JICKTpOHbIC)CJ1109H (5. 6. 26), yCTAHOBilCHHbIC B UCfAX COCIIHHCHHA Ka)IUIOCO na3epa (3, 4, 20) c 6noxoi нHTAHHA (2). B ycrpOrICTBa BKJnO'ICHbl TaX.)KC ynlpaWlscMas CHCTCMaa . opowCHMI (17) 5oHb1 o6pa6oTlcH H CHCTCMa CMewHBWIHS H311)m6HHA na3CpOB, COCTOSWAR 113 OTpa*aTcJlbHbIX 3CpKa11 (7, 21) H CCJICKTHBHO OTpa i(aTCJILHLU(3CpKAn (8, 25), npcfcycMaTpHBa[ol.uau BO3MOZ11OCTh H HC3altHCHMLIX BIXOIIOH H3J1y'ICHHYI.

HCIUIK!'IBTEAbHO!JUIA =J=Eft!HH.OPMALjHH

Kona!>rcnaarayaweJJtto6oama⁹exul!crpax-who!PCT!na!myefiaa!inter=!6ponmp,!a!=opwz
nl6mikywrealicas~xapolua~!ammo!s!eochwtersnelaPCT.

AT	Anemia	FR	Caws=	MR	Maspstraanct
AU	Asciopaxxa	GA	 e6guersina	MW	llnrsP
BB	W oe			NE	Hmnepsaings
BE				NL	&pima
BF	Symms 41sco	GN		NO	How wauc
BG	Sam	GR	&Wpm	NZ	Mann
BJ	\$aal	RU	Hpsalote	PL	Hamm!=
BR				PT	<i>Pyabnasa</i>
CA	Kalac	JP	ICapelicuan!Halomo-Aebur	RO	Poc slOeRept+t
CF	llearpaJuatoatlHasicamas!			RU	LIA
				SD	Csomnia
BY	KIDpra	KR		SE	aann u
CG	nbelhapsul	K	<i>Лавиаста</i>	SI	Tan
CH		LK	<i>Лактекиптейн</i>	TG	Torn
CI	Knapp:	LU	<i>Шри Ланка</i>	UA	Yxps=A
CM	Kant	LV	<i>Любсьбург</i>	IJ6	Colllmau!Qirsrm
CN	laog,soalyuni		<i>Латвия</i>		AmsplOal
CS	rra PKar6uoaes		<i>Медана</i>	UZ	Ya6 .a
CZ	Tap		<i>Мадагаскар</i>	VN	Biencuc
DE		ML	<i>Мали</i>		
DK		MN	<i>Монголия</i>		
ES					

eTpc!cTaaO J~ITili 3 n3epHOS1 06pa6crrKH
6N0J101711eCKON TKaHH (OPO BapHAHTbi)

O6naCrb TCXHHKH

H306pCTCHHC OTIOCHTCA K MCAHUUHCKOH TCXHHXC H MOZCT 6brrb
5 11Cn011b3ODa110 B XHpyTHH, OpTOneAHH H CTOMaTOForHH ARA o6pa6oTnH
MArXHX H TBCpALIX 6HOJ1offYCKHX TKaHCN.

TipCAUICCTBy10111HH ypOBC111, TCXHHKH

H3BecTHO ycTpoicTB0 an o6pa(oTKH TKaHeH 3y6a JIa3CPHIM
H3Ily4CHHCM (naTCHT WO 90/01907. A6IC 5/00, AaTa ify6nHKawIHH 08.03.90).
10 coiepxcaluce nOCJICAObaTCJILtio• pacnOJ10)ICCHHC BAOHb OTITH4CCKOH OCH
HMIiyihCHb114 Jiaacp *H'CPCACT60* AOCTaBKH H3Jly1CHHB K 3y6y. BXA104a10IUCe
OTpe30K OTITHMCCKOTO *BOAOKHa*, BXOA KOTOpOro OITH4CCKH conpocCH C
BLIXOAOM naacpa, H HaK011C4HHK, Bxo2 KoTOporH onTHeCKH COHpa7KC11 c
BLIXOAOM onTH'CKOM BOJ1oKHa, a *Blaze*, ABIIACTCA 13L:XO310M *yeTpoHCTBa*.
15 *IIPHCM*. B KA'ICCTBC naacpa MOKCT 6Lrrb HCHOJ130Ba11 KSK HeOAHMOBL11i, TaK H
rOnLMHeBL11 .WDr 3p6HCBWN na3Cpu.

OCHOBHLIMIIICAOCT4TKOM AanHoro ycpOHCTIia ABTIACTCH HCB03MO)KHOCTL
61,ICTpOH 3aMeH11 mom na3epa Ha ApyroM B!33BHCHMOCTH!OT THna
06pa6aTWBaCM011 TKaH, a TaK)KC BLICOKa 1 onaCHOCTI, Hanccexxx *na3epHOH*
20 TpaBMLI.

H30ecr110 TaKXCe ilaiep110C yCTpOic?BO AAA HC4CHH51 3y6OB, icOTOpoe
ABHACTCA JUIHCX11tC 6AH3KHM 110 TCXHHYCCKOH Cy111Y.oCTH H nPHHATO 3a
nparorxn (nareIT WO 90/12548, A 61C 5/00, Aapa• ny6nnKauli 01.11.90).

J 0 ycpOHCTBO COACp)KHT CuicK ynpaljiciiHA. Ana HMnyJILCHLIX na3epa.
25 QITH9CCKHC OCH KOTOpLiX napaAACJib1114. pacn011o)KC1111WC 11a offTH eCKOH OCli
IVTOpOnd ilalepa. CiXIKyCHpy101ilylo CHCTCMY H OTpe30K OnTH4CCKOro BOAOKtia C
Itaxotic'niHKOM. Ha 011TH4CCKHM OCAX OCx1HX naiepo pacn0J1ioAcem.,t fOA yrnOM
45° K QCSIM 0 rnmecKH COHpa)KC1111LIC MC1Kly COCIOH, i oKyCHpyTOUCM CHC-CMOH
H 011TH'CKHM!BOJ10K1•UM 3epKaJ1a. 3cpKailo. paCHOHO)KC1110c Ha OCH nCpHOR)
30 naicpa oTpacxaTCnbloe, a ua ocii , BToron) na3epa - AHXpOH411OC;
'T.e.cenCKTHnlo OTpa)KaTC111,110c Ana AJIHti4 *Bn:um* H3Ily4ennA nepnom na3cpa
H npo3pa4HOe A1111!A11HH1.!!BOA11101!H311y4Ci1HA!BTOpom.

Ociow um HCAOCTaTKOM 11p0TOTHna AW1CTC31 1ICA(1LTaTO411aA
AtN!ICKTHRHCTL cm npfMCi1CH1A npH PCpCXOAC OT pC)KHMa OAHOIO THna
35 o6pa(crrKH K ApyrMy H ouaclocrt. mane-coma TpaBMLI, cnA3anna e
OTCyrCTBHCM CHCTCMLI unpaCACHSI nnua o6pa6aThBacMOH TKaHH.

PSCKpLR'HC H306pCTCUHA

3ana4a. Ha peuclic KOTOpOH iianpaluuenti 3aa1U1ACMOC H3o6pernnc.
3aKJ1104aCTCA It co3aallHH yCTpOHCI 11a UJDI JaaCpiioil ofpa(oTKH 6H0110TH4CCKOH
40 TKaHH, BLtnoJHataulero ix:e BHAW JIalepnwx'MCp 1HH B XHpyrHH, opTOneAHH
H cTOMaTllnnrx. C 06CC11C'CHHCM npH 5• tTh(no3MC))KHuCTH 6WCTpelm nepexoAa
OTIOAHOpO THna o6pa(nTKH K ApyrOMy H MHMHMaJ1W1011 14111a3HBHOCTH.

YKa3a1111asl iaiia'la pCUJ3CTCA IpH OCyIleCTButeHH H306pCTciHA 3a cyc7
foCTHXeIIHA TCXiM4CCK(WO pC3yJlrTaTa. 3aKJ1N14ammeroCit H OnTHMH7aUHI

pC)KNMo8 OGpaGOTKH H nap:we:rpou J1a3cp1lon) Irsly4cluix A1a11HCHMOCTH OT THfla O6pa6OTKH H BHJ1a 6HOJ1O rH4CCKON ?KAHN.

- YKa3aHHJIH TeXHH4CCKHH pe1y11bTaT H pH OCyUICCTWICIIHH H306pCTCHH2 AOCTHraCTCA TEM. RIO B yCTpOFICTBO nnIA ia3Cpt101n o6pa6oTKH 6HOnorH4ecKort
- 5 TKaHH COACp KalUCC 6J1OK yflpaliiICHHA, 8IdXOALI KOTopOro COCIIHHCHbI C 6nOKOM IIHTaHH 1 J1a3CpOB. HMnynLCHLIC **naacpf4**, OJTHMCKKHC OCH KOTOpbIX napanICJ1bHbl. OIITH4CCKH COIIpHXCHHUC OTpazaTCJ1bHOC II CCCKTHBHO OTpa*aTCnLHOC JJ13 HaHIII 'mama =poor') Aa3cpa Et 11p03pa4Hoe UJA JJ1HHbI BOJ1HbI BTOPOTO J1a3Cpa 3cpKalla, ycpaHoanc11114c Ha OCAX **ncpnoro** H BTOPOTO
- 10 J1a3Cpon COOTBCTACHII0, yCTaII0B1e111bIC Ha 011TH4eCK011 OCH BTOPOrO Aa3Cpa (OKyCCHpyIOWylo CHCTCMy H OIITHMCKKOC BOJ1OKHO •C HaKOHC4HHKOM. BLIXOJI KOTOPOrO 2BJ1WCTCA OIITH4CCKHM IIIA020M yCTpOAC1Aa, B13ACH XOTA GLI OJ1HH IIpHCMHHK HIRI)OpMalHH 0 COCTOAIHH 6HOJ1OTH4CCK011 TKaHHH. BXOII KOTOpolo COIIpA)KCH C MCCTOM ISO3ACHCTBHA Ha TKaHb. a ALIXOA COCAHIIICH C BXOAOM
- 15 GAOKII yllpammCHHI, B1IX0214 KOTOporo COCJ1HIIe111 C BXOAaMH BJICKTPOH11LIX **Knio**ecH, yCTaII06neiii ix **n UensX** COCAHIIICHII **Kaxnor**) **na3epa a** 6nOKOM ImTAIIHA. Orpa)lcaTCJ1IAOC 3CpKallt) _ycTallonnc1u) C lu)3MO)KH0CTLI() nutsoJ1a CR) H7 X011a H3J1y4CHHA, a Ha)IITH4CCKOA OCH IicpII0n) J11nCpa II0CJ1CJ1it)BaTCJ1bII0 II0 X021y II illy4CIIHx pacno.noxtcn , t X)KycHpy1o1uas CHCTCMA H OIITH4CCKOC
- 20 BOHOKHt) C HAK011C411HKOM. AbIXOa KOTOPOrO AI1J12CTCA IIpyCHM OHTH4CCKHM BLIXOAM' yCTpOHCTBa.

- £anCe** 3t KTHBHO yKa3a111b H TCXIIH4CCKHH pC3yJ1LTAT aOCTH1'aCTC31 TCM, 4TO A ycpot%CTao aj1A . na3Cp11OH oGpa6oTxH **6Hnnorw ccKoi1**. TKa11H, Coaepx(awec GJ1OK yllpaNcIIHH, ALIXOUI4 KOTOPOnI COCaHIIICHII4 C GnOKOM
- 2.5 II TalIHA J1A3epOB, HMny11LCIIUC J1a'ICp14, OfTH4CCKHC OCH KOTOpbIX **napantcnw11**. OIITH9CCKH COIIpHIKCHIIide OTp12 iCaTCJ1IIIOC H CCJICKTHBHO orpa EaTenIHC)e 1111W JUIIIBI ntuntbl nCp1lt)m J1a9Cpa H 11tpipa411t)C 1U151 Juu1lu,l A(n1lu,t B1pOn) J1a'ICpa 'ICpKalla, yCTailt)iUIC11114C Ila OCAX ICpBOn) H BTOPOn) J1a3CpOII COOTBCTC HCHHO, yCTaII0UIe111MC Ila t)II't'H4COCOA OCH BTOPOn) J1aliepu
- 30 (Poxyclipy>outylt CHCTCMy N 011TWICCKOC IuutoKHt) a IIaxo11C411HKOM, n1JXon KOTOPOn) 2BMCTCA OIITH4CCK11M BMX 0110M yC IX)11CTBa, BBICaCII TpCrHN HMflyJ1 cII11N J1113Cp. OfTH4eCKaH OCb KOToporo napanilcJ1t,1la OTITWICCKHM OCHM. J1tyX apyrHX **naIepoB, a ltu en**) OCH yCTaIIonJ1C110 oTpaIcaTeJ1bHWC . **3epxallo**, flpH4e.M OTpa3caTCJ1114114C 3CpXana yCT IK IU1c1114 c W 1moxfle)cTbu) mamma mx
- 35 xoua H3ny4en1'a. .Ha 0HTU ICCKON OCH 11TOpon) Ila3Cpa 3a CCJICKTHJ111bIM 'ICpKaj1OM yCTaII0B11CII0 A'11)POC CCJICKTHI1t) OTpaxe11TCJ1ibii0C AJ1A J1n1111L1 At)7111J TpCTLCC(1 J1n1epa II IIptYlp 4to : iLW JUIH11J H(U111.i IICPII011) H 11T0pOn) 11:3CpUA 3C0KWIO, 01TH°ICCKH Ct)IIpA*CIIIIOC C 0Tpa)caTcnb116IM 3CpX11110M, yCTaIdOIUCn11LIM Ha OCH TpCTbCII) J1a3Cpa. C 4t)XyCHpy1OWCN CNCTCMON H
- 40 BXOAOM **011TH4CCKOn**) BOHOICIIa, paCUW10)KCIIIIJX Ha OCH BTOPOI't) J1a3cpa. KpOMC TOIL(), 1111 KU)KU01 It3 UCCA ITCpnoro H TpCTI.cn) na3Cp011 110CJ1CaO11aTCJ1II10 **no xoay** H3ny4cIIHA pacno.11oxccHW tx)OKyCHpy1OWax CHCTCMA H **OfTH4CCKOC** BOHOK110 c IlaKOHC411HKOM. 111,1X0214 KOTOpbIX J1MAIOTeII OfTWICCKHMH AXOJ1aMH yCTpOIICrna. **YCTpOIICTI1eJ1 TaK*CI Cila6ECC1101XOTH(iii**

0111111M npHcM::HKOM111141OpMaUHH!O!COCTOZIHHH!61iO11OrtxCCKOIi!TxaIIIi!BXOI
KOTOp01'O!COnpAJKCIIC!MCCTOM!BO3ACfCTBHB!Ha TKat1b, a BLXOA coeatmCH C
BXOAOM!6nOKa ynpatuieftwi. BLIXOALI xoToporo COCAH!ICHLI c BXOBAMH
3neXTpOHIILIX KJIOYCH, yCTaII0131ICHHLIX BUICTEX COCAHHCHHA KaXCAOCO na3epa c

5 6noKoM naTaHHA.

1lpHCMHHK!MH1hXpMa11HH!C!COCTOAHHH 6Honont4ecKoi TxaHH Mo!zeT
61rrb BLIn011HCH BBH11C CRCKTpOatla/IH3aTOpa B 06JJaCTH 200 - 1500 HM.,!BXOfT
xoioporo oUTM4CCKH!CoIpAXCCI C MCCTOM!BO311CHCTBHA!III!TKaHLK
cOCTOXUuern143 BHCnepCHOHHOpO 311eMCHTa, 11HHCiKH I,C!TOACTCKTOPOB H
10 311CMCHTa.cpan'IenHM!HphCMIMK!NW!OpMauKH!O!CO TOAHHH 6HMOTH!MCIO
TKaHH Tax)KCI!MOXCCT 6l,wmn BLInOJIHCH H BHAC (IOTO3IICKTPH!ICCKOTO!RpnCMIIH\$a
Htld)paKpaCHO/) WUiyYCHHA. BXOU!XOTUpXIU ORTHYCKH Cot1pEJKCH!C!MCCTOM
Boiae CTBlisl Ha TKaiii, foCpCaCTNOM nonoporloru 3CpKarla, paciunozeHilorc
Ha ORTHYCKON OCH Jla3Cpa MCZKay B1.IXOAIIIM 3cpxanoM Jla3Cpa H
15 IIUKyCHpyi uici; CHCTCMOii 4CpC3 4)HILTp c noJIOCON nponycKatUtsl,
HCKAIOYaIOUICH!1101132aiHC!Ha!1lpHCMIIHK H3Jly4C11HR na3Cpa.

fPpHCM)!MK. H11(c)OpMal1HH U!CUCTOHIIIH (IHOAO13YCcxofi TKaHIt MO7KCT
GLITZ CWC BLpHUIHe11 It BHAC axyCTHYCKKoro!npHCMHHKa.!yCTah)OBIIICH110FC)
TaKHM!O6pW OM. 'ITO IlailpalulelmC el%) MaKCiManbHUK!YyitCTUHTCJ1bt1OCT11
20 COCTaBJIHT!C IlanpanncIIHCM otrnviecKoi OCii ila BxonC HaKOHICYHI!Ka yr0J1 a,
yaOBJICTBOA10111HH yCII0BH10: I 1 °<a<86°

BACK TpOHI1Jli XJIOY Mt)KCI! 6JLITI 11(.11tor!ttCtt li L'H,3C
nonynpaiUUIIHKU10111 11111 WICK TpOliaKyyMtol'n HCpCKJ1109a1c1 sI.

A01101111ITCJL110, yeTpOHTCno cila(mtell(cHCTCMOH opouiCillisi 90i11.t
25 o6pailoTKH, cocpoRUwwfi in petepityapa .am BOULI ItoasHILIM HacocoM!it
It03A)IIIlorO KoMIIpl:ccopa, cooTBeTernyc!)IUIe!nLIXOALIKOTOpL(X 06'l.CB 11 1141 1111 It
tlaxor 11HKax HIAIUIxtOTCxlHppll!ra1mH(Iun,IM)i BIJXOaaMil yCTpt) CTBa, a
Bo3AyulH.IHIXOMnpeCCOp!B!Stec..7e COCAHIIIIHA C110311)XO17p0\$UAAMii cna6:tccII
a11CXTPOMaf1!UTJIIJMI KJlan:lilaMH, nOAXJ1104enill1MH K nLIXOJlaM 6noKa
30 yitpatuleIIHA iepc Jnililui 3anep KKH.

H3necTHO. tiro 3t~)t~CK3'Nlui()CTb JlaephIOJ o6pafx)TKH 6HO11orwiecxoH
TKa!!H C OA1101tpCMCIH1LiM 06CCfCYCHHeMIIHH3KUH!HIIna314BIIIOCTH!(cTCne11c1
HeKpO3a)!3aIHCHT!OT!,MHIibh!•110111111!H monument Jla3epIIOrO H3Jly'iC11HA.
3HCprHH!H!HpCMCIH Jla3epIIUro B03JtCHCTa11511t. JLitl HCCKITCpbIX B11110B TKalil,
35 ZHAKOCTIIOrO opOluCHH11 7OHL1 na3cpiofri O6pa6OTKH!(CM.,!HanpuMep,
Proceeding of ... Laser-Tissue Interaction V 24-27. ,january 1994. Los
Angeles, California Vol 2134A).

HCCJcm)Aii1111k, npmeltei111Je alcropoM, HoKa'i.11111, 'tiro Hp11 :~Tt)M
IIeofixo!IHM:I 0111lonpt;MCinlasi On33iMH'tali!x yica'laliinix napaMerpu't ansi
40 Ka)K1101'IBHUa 6Ho1'KiHiii!FIIMMIt CJ1011aMII, HCoJxonitMhI:
1. BO3MUZIIOCT1. Bbl6opa onTHMaJII.IIMX1.NJIIH!BOJZI!IIUIy'ICIHH!Jia3GpoldMIII!HX
CMCCH,

2. **peflicrpauHn npauccea na,eptiotii** AcCTpyKytiiH. BHAII H COCTOAHHA 6HOTKIIHH H ynpfB/CHF A AJIHHOii BOJIIILI, MOLLHOCTLIO, 3HeprHCH H BpCMCHCM na3Cp110P0 ACHCTBHA.
3. CHCTCMA Opowe) 3011111 *1ia3ep110H* 06pa60TICH.
- 5 COBOXyTHOCTb BOCACHILIX B ycrpoicTBO XOTR 6Lr oAHOro npHCMHHKa HH4OpMa11HH O COCTOAHHH o6paGaTWTBaCMO4I 6HOJiorw1ccxOlt TKaHH, BWXOA xoroporo COCAHHCH C BXOAOH fuloxa ynpaEICHHA, H 311CKTpOHHLJX K n104CI, yCTAHOBJICHHLIX B HCIIAX THTAHH *na3CpOBH* ynpaBrRCMLIX BWXOAHLMH rHilia1taMH 6110Ka ynpaBJeCHH. npCACTBB11810T C060N CHCTCMY 06paTHOli CBA3H.
- 10 KOTOpax o6Cne4HBacr ABTOMaTH4CCKHC *KOH'* rposU H OTITHMambHOC ynpaBJe11HC napaMeTpaMH W 1y'1CHH1i na3CpOB B 3aBHCHMOCTH OT BHAII H COCTOAHHR o6pnbamrBaeMoli TKaHH H, TCM CAMLIM. O6CCnC' HBACT MHIIHManbHyIO HHISa3HI)HocrL.
- 15 HC06XOAHMoCTL aHTOMATH4CCKHX K0ln-pans H ynpaBJICHHA BW3BaHa 4aCT0 B03HHKIIIOWei HCB03MOJKIIIOCTLIO BH3yambHOCO OnpCIIJCICH11 Bpa90M COCTOAHHA O6Jly'aCM0 % TKaHH H CC BHAA.
- HaJIH4HC ABYX IIC3allHCHMI,ix BLIXOAB B OAHOM *yCTpONCTBe 6Jiaroiapn* r103MO)KHocTH BLtnona nrpa*aTenbnurt) 3epKana H3 XOJla n3nyYCHHA nc110pa Jlaicpa, a TaKMCC B03M0)KIform 'C MCI U Huai I 11 A H3ny9CHHli ABYX n r epon
- 20 noBwwacT' ;C *KTHBHOC TL pa(x)TL, lipH 06pa6OTKC **CHOTKAHH**.
- Ha m%)He B on 'Tom yCTpocTBe am c1GpaGoTKH CIHOJtOTH4CCKOlt TKaHH TpcX *naJepOB* C pa3JIH'I11,IMH IUIHrUAMH Ball If H111y'•iCIHHH It HC3afHCHMGtMH maxoABMH H . C B03MO)CIHOCTWI) CMCIIHHBa11HN M3ny4eHHli 06CCr1C4HBaCT 1laH6nnn1.LHylo maim U,1iocTb r1pHMCII11HA yCTpOHC Tba H MaKCHMallbHO
- 25 pacwtips eT ero BtnMt) KITocTH. Hanpn1M(:p. npH OAIIOBPCMCHHOM B03ACHCTBH R)J11.MIiCBI,IM H IleouHM0131,IM naiepaMII lla o61tJ1L1(1 xponoIIaC1dWei11we Opra11LI CIIHMat.Tcx onlacuacrb Kpt)1u)re4emu, nplt 1IeealiKUHoiIHpoBalldoli nep4x)pailHlr KPytullIX Kp(NUIIOCIUwX COCyAOB, a C04CTAHHC H ii 3pHCBOru. Jla3epa C HCOAHMOIIMM H rO6MHCBbIM 9t KTHBil() npH O6pa()oTKC =flux **'Malta li**
- 30 TBCpALIX TKaICH 3y6a. *AJLA* CMCWHBa11H31 H311y4C}1HA TpcTLCrO naiepa C ABYMSI ApyrHM11 WLH Ka)KIILIM H3 I1HX BBCACHW OTpaAUITCJIL1IOC H CCJICKTHBHOC 3CPKaria. yCTa1IOAJICHHWC COOTttrcrIICIIIo Ha OCAX TpCT1,000 H BTOpOra na3epon. a B03MO)IAIOC Tb BI4IK)Aa OTpaXCaTC:wbn11X 3CpKan in xona H3ny4CHMI H
- 35 HaJIH4HC AO6W11FITCJIL1ILIX CxOKyCHpyIOWHX CHCTCM H C)HTH'icCKHX BOJ1YK011 o6eci,c' IHBACT IIC UBHCHMOCTb TpCX OHTH'ICCKi4X BKIXOAOB yCTpoiCTBa.
- A)non111rTCJIL1IO B11CACI1Hall B yCTpnNCT1u1 CHCTCMA OpojCIHR, ytl()a11TISlt;MaA 9JICKTpOMa11HT11WM}i KJlaI1LLHaMH. II011KJ1IO4CI111IMH K BbiXOAIIIM (inoKa ynpalm CIH3f OGeCIIC IH1)aer orrrt) LHblne Ca4CTaHIC pCXH Mots 0611y'ICI1HA H ()pO111CI1HSI TKaHH.
- 40 17U CBCACHHAM MITI)pa CO&)KpiNEWT b H33103KCHHbIX B tt)OpMynC H7o6pCTe11HA npH311aKOB • AMACTCA I1o11011. a cam() TCXIIH4CCKOC pollen He nn0BruCTrop11 CT KpHTCpliK) " H3n(SperaTeJ11.CKH1H yp011elib "

Kpar oe anncalule 4epTex(er

Cy111HOCTb WR)6peTCHHR noxcmxCTCB Ha 4pH ypac, rite

4n1r.1 - H3o6pacac-r CXCMY ycrpo%cmma nix Jla3cpHO % o6pa6OTKH 6HOTKaHII.

4 3Hr.2 - CXCMY napHairTOB BbtfOnitCHHJI H pacnonO (CHHA npHCMHHKOB

5 H1HbOpMa11HH O CoCTOAHHH o6pa6aTLIBaCMOH 6moTxamH.

4Hr.3 - CXCMY ycTpoHcma npH HWIH^M IHH Tpcx na3CpOb

430.4 - CHCTCMY HppHraluKH.

4,Hr.5 - 6aOK-cxeMy 6rioKa ynpatilCHHA.

YCTpoHCTBO JlnR na'epnoil o6pa6o7'xH 6HOnorH ccxoH TKaHH (4 Hr.1)

1.0 cocTOHT H3 6nox a ynpannCHHA I, coeaHHetmoro c HHM 6nox a nHTatn1R 2, HMnynbCHblx Jla3Cp011 3 H 4. COCLHICHIIIX C 6nOKOM fHTaHHA impel

aJ1CKTPolrHW e tJII0⁴H 5 H 6. KOTOptae noaKnK)tiel1,t K BbiXOnaM 6noKa ynpaLleHHA 1. Ha OnTH⁴ecKHx ocxx na•lepon 3 H 4 pacnonoM(Clibl. COOTBCTBCHHU, uTpa*aTcnlilloc *icpK-JIO* 7 H CCACKTHBHOC 3CpXMo 8,

15 KOTOpbC OOTH⁴ICKKH COItpA)KCIIGI MC)Kay co6oH, 4t oKyCHpyloIII CN CHCTeMC '9 H Rr.IXOAimM TOpUoM ofTH4ccKor) .noiiiox11a 10 c IlaKOHC4HHKOM 11, pacrtonoM(CIIIIux Ha *onTH4ecxoI%Iocu* na3cpa 4. CencrrHnItOe 3CpKaJio 8 oTpa)KaTenbilo JlnA H3Ily⁴CHHR C JIiHIIIOJ(nonubl na3cpa 3,Iuo npo3pa4110 JUTA

H3ny4CIHt1 CJUIHHON 1 O.111l,tJta3cpa 4. Pacno11oxtefnoc .ila ouTHdCCxoit OCH na3cpa 3 oTpaXaTent,IIor: 3epxanc) 7 I1onKJHo'idto x nbtxoay 6noKa yyTlpalvCHHA

20 1 H B ncuroxetuul A yCTallalunrlac1cB BOX yrJIUM 45° K OcH, a B nOMKCI111H B Ilapanncnbttn eH. Ha aTO⁴ ix nettl iICJICa 'la 1epKanOM Ilt)CJteaOBaT:(nbll(1 1la XO1y H3ny⁴CIiHR paCIIIOJIOZC111bl 4'loxye{ipyioivaSI CHCTCMa 12 H OitTH4cCKOC BOJIOKUO 13 c itaKUUC:411HxoM 14. K nxouy 6J Oxa ynpaltncHHSI 1 nouxnietreu

25 3iCKTPH⁴ICKHH BbiXoa IlpHCMHHKa H114bx)pMa11HH O COCTOA11HH 6HoJIOH⁴ICKOH TKa11H 15. nxoi KOTOpOpO COnpA)l(CII C MCCruM Ilo1Jlc%CTBHA Ha fHOTKaIib 16. CmcTeMa HppHrC111H~r 17 11onKJIO⁴CnIa K TCM)KC BI,Ixo,aM 6JloKa ynpanncmmx I. 9TO H 6nox turraHHM 2. a CC IK)aAUuf7 H IIOMY11.1111di *nioxOnbl* 18 11 19 o6i,cnuuctla n IiaxoIloIHHKC I 1 (14).

30 .11y4untii napuaur acyulcc•rnrinmi u•:u6pe^rrcu1SI Ha clmr.2 upacratuicll uapHat1T ycrptHeTlia c TlieIt na•tapaMH 3. 4. 20. Ha oi1Tli4ccKuui oclt Jla•:epa 20 ycrainutcu *inpax(aTenbHoe* lcpxau() 21. xftOpnc Tax ACC, KaK H in' a'rCJtbnoc TCpKWii.7, IIOakJyO'etio K 6noxy yllpalutetiHA I. H B luVIOMte11HH A yCl'aHaIIIIHIIACTCA BOA yrIIOM 135° K

35 OnTH4CCKON OCH, a li fWIOM(CIIHH B napaiucniato CK. Ha ETON A(c OIITH4ccKO OCH paellOno)KCIibt 4#)OKyCHpyIOH1:WCHCTCMa 22 H fXOJLHOH TOpeu OitTH4ecKOTU Bonoxila 23 c ItaKO11C411HKOM 24. MC)K y 4poKyempyloaiel% CHCTCMO1 9 i4 CCJiCKT1tnIJbIM •tepKanoM yc-r lto1L1ein RTOpoe ccJICKTHImloe 3CpKanO 25. KOTOpC)C OitTH4CCKH Co11.pA)KCIIIO C TepKaJIOM 21, z KyCHpylouterl CHCTCMOH 9 H

40 BXOnnb1M TopUOM oITTH⁴ICKUIt) lionoKIfa 10. CCJICKTHBItoe 3cpKar10 25 OTpa):aTCnb1lo IU H't11y4C11HAC JlnHt1OH nuniii Jtalepa 20, no npoipa4110 n.n It371y⁴Cii{11{ 4 JUIIIAMH UoJli Jla•3ep0B 3 N 4. BJlox 1111TAiiH5i 2 cocanrell c na3CpOM 20 4Cpc3 3BCKTPollub»a xnio4 261.

- Pa311013HixIOCTIMH npIICM11HKa H114X pMailtH 15 0 COCTOAHHH GHOTKaltl
16 i.oyr 611r1. **Kax** CnciTpOaltaIIH3aTOp **27 (ciHr.3), Bawl** xOTOporO
 ORTH'ICCKH conpAMcell C McCTOM 1103ACNCRthHA Ha 6HOTKaILL **16.** H 1(OTOpb111
 COCTOHT H3 **AHCACpCH011110rO** 3IICMCHTZ **28.** AHuiCr%**H** dxYTOACTeXTOpOB **29.**
5 pacnonoxccHHOH MCCT.0 COOTBCTCTByIOWCMY 0611aCrH AJIHII BOJIIr **200 -**
1500iIM H 3110MCHTa cpaB **eHHA 30;** TaK M **4** OT0911CKTpH'CCKH i npHCMHHB
Hir(Ppaxpacnoro in.ny^gCHHsi 3I, OfTWICCKH COnpR)KCHHLIri C MCCTOM
 130311ciCBHa Ha 6HUTX1aHb **16** JIOCPCACrBoM OITTH'ICCKOrO B011oxHa **13 (10, 23).**
4)OKyCHpyKOWCH CHCTCMLI **12 (9. 22)** H fOBOPOTHOrO 3CpKJJla **32,**
10 pacnonozeHuoro McMCAy tj,oxycHpyloweH cHCTCMOH **12 (9. 22)** H 3Cp?anoM A
 Mnli HcnocpepneHHO **nepeA** Bi. xo bt, 3epKanoM **Aa3epa 3 (20).** I7epeA
 OHTH'ICCKHM BXOAOM **11)OT03JICK1pH'1eCKOC()** npHCMIIHKa **31** ycrail:Men
 HHtf)paxpaculdi OVILTp **33.** nculoca nponyCKaHHW!Kolum!HCKJAO'taCT
fcnaAaHHC Ilii k.,TO1rnCKTpH'1CCCKHH npHCMIIHK **31** H3jiy'ICHHA .na3epa. B
15 Ka'iCCtise npHCMIn n a 11114x)pMauHH **15** o COCTOM111tH GtonOrH9CKOH TKaHH **16**
 MO)CCT 6LR6 H axvcru'CCKiiH tIpHCMHHK **34,** pacnono*Cnmd% B6rmm ;Accra
 BO3ACHCTBHA Itil TKailb. - TAK. MTU ttatlpxacHHCl-Jcr0 **MaxCHMWlw** OH
 'yeCTBHCT11b11OCTH COCTaMAeT C **OITtH4CCCKOH** OCLIO H311y4CHHM Ha BLIXO11C
 ilaxolle'1HHKa **11 (14. 24)** ynul **a,** JICXCLIIHHii n!lpenenax OT 11°11086°.
•20 B CBA3H C TCM. 'ITO 'INCJIO npHCMIIHKOB Mnl4)OpMBI11111 n!cocroAHHH
 C)HOTKallH MO)KCT X0JICC)aTLCM C)T 01111(0111111)() ACIMTH (no Ka)KIIOMy BHAY. OKOJIO
 KazA(nx)!naK0ne^giiHKa). XI H' a.-, I t) ItX(AC)() Gnowa ynpanneliHM MOxct r)Lrrb
 panlit) MCRRTH).
 CHCTCMa 0p0n11c111t2 **30111.1** o6pa(cn*KH ' **17.** Hro6pixcC1111as **llaI(,Hr.4**
25 cOCTOHT in!prscnyapa nJIM 111111.1 II)AMILIM HaCUCOM **35.** K KOropOMy
 npHcoc11Huella!noAonpoBOnsru1asl Tpy6xa **18,** H lunaynulOn) KoMnpcccopa **3b.**
 17pHCOCBM11c11101e K IO311yHIIOMy KOMnpcccopu **36** IY) (0npcoO11aulltc
 TpyxH **19 cna6xae;n,i** WleKTPOManHTHWMH KJianallaMlt **37..38. 39.** Kenop1,1C
 IUIIKaIo'1eHli K TeM MCC IILIXOAaM GnoKa **yrpalUletllra 1.** HTO i1 6n0K nHTatlfM **2.**
30 'sepezlnHlHH 3a ICp,IKKH **40.41.42.**
 YcrpoHCrn0 pa6x)TaCT CfCayloniHM 06pa'1)M. Fbny'Ienhls.naicpon **3. 4.**
20. B Cny'ilce Itaxuxutelltl t)TpaMClrrutt►nLtx UEIK/111 **7** H **21 n** 110MOXCIIHlt **B.**
 upoliiaa (I)OKycipyloicnc cFlcTcMla **9. 12. 22,** trrpe um OHTH'ICCKHx i oiicK0r1 **10,**
13. 23 H 11aKU11CN11HKH **1 J. 14. 24** IIOCIyHalOT Ila aliTH'JCCCKHC BLIxOut.i
35 ycTpoi"icTba.
 Ecnu **orpaxcarc.miali.lcliepxana 7** li **21** Iraxousrca B nmno)fcC111IH **A.**
 irsnycuuc ria3epa **3, OTpa3HB11HC1!OT** 3CpKaJla **7** nonanacr. Ha **CCACKTHIM10C**
 3cpaxa) **8 H.** opalHIIIIHei, **oT** Helr). Ilaipalul)ICTCM II110J11► 01TWICCICOr1 **OCT1**
 na*sca **4.** Ananunl4rul, upu Hammitt **Jla*sca 20.** WUIy'Ir:hIHC ;,role) **Jlalcpa**
40 OTpa-HBUHCL OT 3Cpxalla 21.a 3arcM oT -crnc:KTHIMIOIO **3CpKWla 25 TaKMc**
HanpaicTcxililn(sJll, unii'iccKOH UCH **Jla*sca 4.** B pc3ynt►TaTC, II **CBR1HICO**
 CBOHCTIx)M ccncKTHIIIIIX ICpKarl **8** II **25. B** (~c)KyCHpyluwyIII **chCTCMY 9** If, TCM
 CaMJ IM Ha OATH9CKHH 81,IX011 11aKOHC'irHKa II MOM nOCrynaTL H1Jly'JCIHR
 nCCX Tpex Aa3ep011 0111io11pCMCnI110.

- Bb16op BH11a 11pHCM11HKa Hncbx)pMauHH 15 o COCTOAHHH!6HorKalH 16
 3aBHCHT or BHJa TKarH H!pC1CHMa!o6pa60TKH.!a Tax)ICC. OT!BHAa HaxOHC4HHKa.
 npH!pa6OTC!C!HCKO1ITaKTHLIMH. 11aKOHe4HHXaMH OCHOBBa9 4aCTb 313Jly4e.HHA
 apomoniiro ti'JaxC11a, B0311HKa10wer0 H3-3a!CBC'4HHA!yliaAACMbIX!'iaCTH/I
 5 6HOTKallH!JICACTH!Is BHAHMOYt H!(JIH1ICHNX yJibTpaCtHOJICTOBOI(H Hur)paxpacHoH
 o6naci x cnexrpa (200 - 1500tiM) H MAerc9 npH4HH011!HCB03MO)KHOCTH
 B143yallbiOro!Ha6J1TOACIHH!1H/1a!H!COCrOAHHA GHOTKaHH. C!ICKTpanibHLIN COCTaB
 H31.y'ICHM\$! 3posHOHHOro 4xu c3a 3a^gr.CHT or BH.aa 6HOH aHH, noaTOMy
 He06XOIIM CncxpanbHWH aHallH3!3rorn!KanrICHNA, KoropoC nonanaCT Ha
 10 IHCICpCH011HLaN aneMCHT 28 CnCKTpOatlannH3aToPa 27, pa!JiaaerCH!B Cne)trp H
 nonauaCT Jla nHHetitxy!cirooACTCKTapoB 29. COCAHlclly)O C!3JtCMCI1TOM
 cpanneliNA 30. Ypottcllb Bbixont1010!raJICKTpH4CCKOFO CHnlaJia 3JiCMCiiTa
 CpaB11CI1HH3(!)COOTnCTCTnyCT!KinIKpCTIloll K<)M6H1IauIH AJIH1 tso.n cll!eKpa
 H31y4CHNH p03H011110r1) ihaKC11a.BJIClap!H'ICCKif CHrHaJI OT 3JICMCHTa
 15 CpaBiletHA 30 Cr1CKTpOaliMH3aToPa 27 nocryiaaT!Ha!BXOA!6no.a ylipaBTetiHA
 1. CAC!Bbipa6ambinacis!C.NrttaJilH3MCIIHHA!pCIKHMa!H3!1y4CHHH natcpoB.
 Pa6opa c KOITaKTH,IMH 1laK0HC413HXaMH CBA3aHa!C llarpCBa11HCM
 J1a3Cp!LIM H31y4CHNCM T0pua paGo'iero H11CTpyMCHTa (ROIOKH ilIH
 CailchnpOnbli 1taKOHC4HHK) AO onpeacnenilo TCMIICpaTypU,!aocTaTavloit nna
 20 pa'pyieitiu 6HCkanin. 1'larpcn - MCCra &IBCNCCTBHA COApOBOX!aCTC\$1
 BOIHHK11OHCHHCHM!H1chpaxpaCilcn) H311y4CHHx,!XOTopoe!nepcaaCTCA no B01IOKH
 ilaKOHC41HKa 11 (14. 24) H olpelxy OIITH4CCKopo!1s0J1oKla 10 (13, 23) It
 ilanpaHite t!Hit. O(!paTHOM xony na3eplott) H3Jly'ICIIHA. oTpa*aeTcx ar
 nonopcmlon) 3epxatla 32, npxnAHT HllfhpapachLIN!ch11116Tp 33 H 11onaziacT na
 25 ttUT0:9J1CKTpH9CCKHH!1pfCMliHK 31. arieKtpf4CCKH41 CHINall C Bb1XOA!l
 chOT05)11CKTpH4CCKort) npliCMlilma 31 noCrynaCT B!6JiOK ynpaliIMCIIHA 1. CAC n
 3aBHCHMOCTH OT napaMC.tipOB Brow CHIIa l:1 iii,lpa6arl.inacrcw ClinlaJl!:
 OcraioirxH!npOAIJI)KCIHR HJH N3MCIIHHA!pC*HMllpaGOTb1 Ila3epa.
 3KC1CpHMCIIJaTt,IIO yCTaI)OMCIIO. 4Tt) TCIIJIOBOC H3Ay4C111e.
 30 IK1311HKa10111CC npH!..pa('OTC!C!K011raKT11bIMli HaxOHC4IHKaMH ItaXOAHTCA n
 rny6OKOA Nllrhpxpaci!lo arilacrii. B Bur^g CranaCTH!'iyncrnHrcnt,Hurril
 (~)6)T011ICxrpH4CCKHX ripHCM11HKo c)4cnb Maltu. CnCKTpall I la^g u(n 1CTb
 H311y4CipHA Jla3CpCB TaK*KCIJICXCIUT!B!HiuCltpaKpac1IUM tif3Ilacrii. noBTOMy!tIOJ1OCa
 IlpOITYCKallHR Hllchpxpachloro tmH111,Tpa 33 CcM Hacona11a co cnCKTpajlbliOH
 35 4yBCTnhiTCJ11.IloC1bK)4X)TONpHCMIIHKa 31...c OKIOM!nperipa41IOCTH!OIITH4CCxOrc)
 Hnaoxla 13 H!n&CtI'IHaaeT!HCK11104C11HC!nOllaaalnHA na chnonpiieMHI!K 31
 11111y'1CHNA!na3cpn 3. 4. 20.
 f pouyxl.1 na3eplio pa3pyWC11HR 6HOTKallii painc^rralorex t0
 CBCpX31syKOROFi CKOpOCTHO. H!it CJICACrBHC pCSKOR)!HWMCHCIIHA Aa1lic11t1A Iri-3a
 40 conpOTH1111CIIHA epeal.1 rCHepHpyCTCH!axyC'TH4CCKUA!IIIOJIII:l. Aja pa3r11'lub1X
 TKallCA aMniunyua axyCTH'ICCKO BOIilil!pu3fH41a. Amin) TyAa. axyCTH'1CCxc)ji
 BONill.t perHCTpHpyCTCN aKyCTH4CCK34M!lipHCMIIHKOM 34, 3Jlexrpit4ecKHt
 CHrllaJI C Koropopo TIOCTyrlaCT!Ha!6J1K!lyrlall1C1111A 1. me CHIITC331pyCTCx
 cHntall Bpemciti10H Ocranncif iiviy4cuns Wiii!It3M1IICIINx!pOKHMU!pa6x)Tbt

naacpa B 3azite1MOCTH a-r THtia o6p:16am1naeMo% TKaHH HuH H cny'iac
npCBI4111CHHA 9HeprHH na3eptlollo HMnynbca Han nopopoM p a3pyWcIIHA
6HgrzaHH. 'ITO 1UIHACT Ha CTenellb na3cpHoro Hexpo3a.

- 11pexpaweHHe. a Cny'iac Hco6xoAHMOCTH, pC)XHMa H3Jty'1CHHA na3epoB B
5 CoOTDCTCT nH C CHrJlaJlaMH CncXTpOaIIami3aTopa 27. 44oToJJICKTp31 ecKoro
WIH azyCT VICCKOro np1CMHHKOli 31 H 34 npoHCxoni'i' C IIOM0111b10
6blcrponeHci ytuowx HJlexTpontlix K4109CH 5, 6; '26. CHrHan c 6Jloxa
ynpanrCHHa 1 nonacTC31 Ha ynlpaBaArouHN BXO aJCKTpOHHO O ICn104a 5, (6,
26) pa3MwxaA UCnb nHTaH14A xa*1101.0 H3 na3epoa. HexpalilcltHe HMnyJlba.
10 H311y'1CHH4 91txJICKT114110, CCJH BpCMA OTIU10'1CHH11 nHTa1HR MCHLWC
JUIHTCJlbHOCTH HMnynbca H34y'9Cil11A. (AJHTC11bHOCTb HMnynbea HJly'1CHH2
MOZ T 6Lth 150 - 500 Mxcex.). flolrroMy u xa'Iec-rw 3Jic1CTpollioro xnlo4a
ao.nzCII HcntJlb3oIwrl cx : nemetrT C BICUKIIM 61,1crpoaclicTnHCM. TaxHMH
ynpaIm(eM).IMH KJIK19aMH EIUIRIOTCA nUS1yIlpO11O1111KODble HJH
15 ::u1CKTUpouaiyyMlii,lc 11Cp&3UUt'lal'CJ111, BpCM7i Cpa6aTE,IliallHH KOTOpb4X VC
npclSLIWicT IO() MKC.

- OpO111C111ne 6HeirKa11H c IIOMOWblo HppHra1IHOU11017 CHCTCMLI 17.
rlpoHCX04HT C11Ctylo11111M O(pa3OM. H3 pelcpRyapa AJIR 130A1,r C 11o11Anb1M
IcacOcoM 35 nova 3anoJitlclCr IulnollpononRutnc Tpy61H 18. B cny'tae
20 11eOCxc11HMOCTH OpoWCIIHR TKallt CHnianla N3 6nnxa ynpannCHHB 1 nocrynattrr
Ha aJICKTpOManIHThraf x ianalt 37 (38, 39), KOTOp&IH OTKpb4DaCT HOCTy11JICHHC
IITIAyXa 1104 nawleIHeM in I1 311y1111Oro KCIMripCCCUa 36 n no34yxenpo11012 19.
KC>IUBI BUAU- H IurinyxupoicwXHtnx Tpy(xn: 18 It 19 pacntlnuzclibt u
liaxonc'ntnxax 11 (14, 24) TaK. 'iTe) nncnyrulclHe. 310111.1 Ha HppHtaalmo 111Lic
25 Dlxonr.l ycTpOHCTBa 11 01WX JI11T lipH rloua'IC 110311yxa 110 npltnlniny
nynnpnpH3artpa.

- CHflaJlLi H3 6JInia ylipanliurnM I ntx. ynialln' Ila 3JICKTpt/Mar11NT111Le
Knanaill.1 37 (38. 39) 'Icpc3 nIBIHH 3aUep)KKCH 40 (41. 42) OAHODpCMCIHO c
CH111anaMH 3Wlycxa KMliyJlLCI)IS rCliepaUHli Ila3CpOIS 3 (4. 20).
30 Opa1uCI11C 6HuTKa11H Isouorl 401O:IUO I1pt1NCXWIHTb a 11p0MC:I:y1KaX
MC*J1 HMnyllbCaaMH H1Jly'JC11lt9 11:13Cpoll (c IIC111.10 H36C)KaTb IICZCJ1fTCn1fOC
pacCCMI11C iruiy'lt;tlitR JI 11d1114CHTb ~cJ1c~x:Klin11r1CTI. Opa111C1114). IOBTOMy
1UIHTeJlIIOC •b I1pCMCHH 3 uepxu:H JIH11HH 3aJlepzKH 40 (41. 42) . panful .
11pCMCIH10N ,I JIHTCJlrlclCTH HM11yJl1tY1n innycli}t3i Jlaicptln C y'SCTOM ISpCMCI11i _
35 11OCTy11J1CIH31 Iu)3nyxa K KOI1U1aM Tpy6UK 19.

11pBMCP x011KpCTHuri pCaT1H1aUHIi 3a1MACMbIX yCTpoHC.mI COCTOUT n
cnenyluuLCM:

- Snort ynpatncnHN 1 (01r. 5) coCTOHT 1i3 ycHnlrcnsl BXOA111X clinlanols
C H11TCrpaTOpOM, flocbMitKa11aJlb11c)ro JicC:ATHpaip2ntloro aIIWIOro-unrl3pOIK)ro-
40 npC06p83OaTCJ1}I (ALM) C noCJ1c4c)IaTW11.1314M H11TCpCJ)CHCOM max 192 CepHH.
npU1teccopa PC-104 Knap11C111M 1'ClieprroproM 11 BOCbM1iKa11W1b11oro
TpHHa111aT1paipAUHo11 ItHlpptt-anaJ1b>dlu)1T1 r1pc.u6pa3uli;rrcilst (Uaf) . c
n0CJ1CA0B3TCJ1 11b1M H11TCpCf)CNCtlM max 540 cepim. Bblxouuble CHrHant4 LIAH
1WISICYCJ1 814XO11aMli 6JIOKa ylpaiUIC1110i 1. 110 TpCM H3 KOTOpbIX, K11uMe

cHtllanou 3anyexa NMnynbcoi rencpainHH.noc1yna1AT CHntalll. onpeaeJlsx►WHe
BCJIW1HHy 3lcp1'NH HaKOIIHTCJILILIX KOItilelCaTOpOB drum mirami^g 2.

- 5 B xa'IccTBe naaepos Hcnori63ycTCa 1la3epLI: Nd:YAG (*lama swami
1.06 MKM HIM 1.32MKM). Ho:YAG Omuta BOJHJI 2.09 MKM) H Er.YAG (IIJIHna
nonHJI 2.94 MKAI). B xa'iccrnc JLHCncpcHOHHOTO 911cMCHTa 28-crex.nsiwHaa
npH3Ma.. B Ka'1CC11e. ttXTt'OACTCKTOpOB 29!- KpCMHHCBMC nofynpOBOUHHKOBLe
t oTOAHOALI 431A-256. a a Ka'IeCTBC • 41oTOWICKpH'iCCKOro npHCMHHKa
H14paKpacHoro H311y4CHHR 31 . -rc^PManHe it (jx)TOHHOH X11-9. 3ncMCHT.
CpaBHcHHa 30- .MHXpoCxeMa K554CA3 1inH LM-111. AKycrn9Ccxmi
10 npHeMI(Hx 34 - MHKpO410H B&K4138..

11poML1IUICHHa11 npHMCHHM0CTb

- TaxHM OCpaloM, npennaracMLte yctpoicTna. 3a c4CT COBOKy1111OCTH
3atBnACM10X npH31naKOB. o6 elle'iHBat onepaTHBItoe ynpaBJeHHe, c
1103Mn7K11OCTbIa 11apbHpollaIHS1 11 IIIHpOKoM nHaIMOnC napaMCTpaMll na3Cp}OI•(t
15 Htny'teluHfl, 110711OJ1AltTr IlpOHU1LHTL XHpyprH'IccKI a IlpO11CAypbl Ha 6HOTKaHAX B
Ka'ICCTise JIHfidel CKant.nW L. JIH60 KOaIPIATopa. JINGO ACCTpyKTOpa B
3aBHCHMOCTH OT Tpe6ycMLIX •THnytt.. pczHMoIi H CO'iei a[iHli pa(oTJI J1a3epOB.
opHeirrHponailil63x 1ta MHHHMa1H.1tyM1 .TpanUaTN'lltocTb npH nalltitl i BHAc
UO3HCHCIBHt Ha Aaittyio CHoTxaln..

4opfeyjia iuo6pe euw

1. YCrpoliCTBO NIA na,cpnoit 06pa6oTKH 6HOnorw ccKON TKaHHH, COAcPCCa111CC 6JLOK ynpaluleHHA (1). BLIXOAW KOTOpOrO COCJIHHHCHLT c 6nOK6M nHTaHHA (2) J1a3Cp0B. HMnynLCH11C n83CpL1 (3, 4), ORTH² CCKHC ocH KOTOpbIX
- 5 napaJfnCnbHLL. OTTHLICCKH CONp2ZCHHLIC OTpa)1CaTCnIHOC 3CpKan((7) H CCJICKTHBHBO OTpaZaTCnLrloe Jinn n71H1w BOJHla nepBOrO Jia3epa (3) tt npo3pa¹iHOC .unfl JUIHHw BOuHw BTOpOra na3epa (4) 3CpKanO (8). KOTOpb1C pac11cJ107IcCHLI Ha. OnTHHCKHX OWIX 11CpBOFO 'H BTOpOre) J123CpOB COOTDeTCTBCHHO, ycTaHOMCHHLIC !la onTH'1ecKOH ocH sroparo na3epa (4)
- 10 dOKyCHpyIO111y10 CHCTCMY (9). H ONTH'icCKOC -OJ1OX110 (10) CHaxoHC'itHKOM (11). BLIXOH zOTOpOrO AtJIACTCA onTH4ecx.HM BLIXOHOM yCTpOi CTBa. oTJ1H'1aIoIo00A TCM, '1TO B nerO nac ie i XOTJ1 61.i own) .nPHCMHHK Hlt})OpMaUHil (15) O COCTOAHH (H011Or'H'ICCKOH TxaliH • (16), nxon KC)TOpOrC) conp)OKcH c MCCTOM BO3Aei CTBH Ha CHTrrKamm. (16), a BLIXOJI COCAHJCH C DXOHOM 6nox.
- 15 ynPaMCT'HSi C). BLIXtula KOTOpOT COCAHtellbl c HxonaMII B.nCKTpOH11bIX xnio'1ci (5., 6). ycraonncrnu.ix n ucunx C0CJIHHCHHA Ka)Klaort) naaepa c 6JOKOM HHTaJji (2). xpQMe Toro; OTpazaTCJmIH)e 3cpicano (7) yCTallOMCHO t, B03MO)K11OCT1.10 BWBOAa Cr'l) H9 xona H3ny'fCllttA. a lia OI1TH'ICCKOH ocH nCpBOre) na3epa (3) nocncnonaTcnLUO nu xoay H'uly'icnit51 pacnonOxcella' 4 OKyCHpyIOwa i
- 20 CHCTCma (12) H Or1TH'1ecxoc Iuuic)xno (13) C 11aKOHIC41f IXOM (14), B11X0 KOTOpOrO RWI2CTCA ApyHM O1rTH'ICCKHM 11LIXUJ1OM yCTpOACTBa.
2. YCrpOIACT11t)J111J1 i1;llt:pftoM o6paroTNH (iHOJ10rH' eCXOH TKAHN. cOllcp)Kaulce 6nOK yllpaMcftrlM (I). nLXC)llra xoTopnra CoCJIHHHCHUJ C 6nOXOM nitTa11HH (2) Ha3epun. 11MllyJshetLU: Jfa•1Cp1.1 (3. 4. 20). anTH'1ceXHC ocH
- 25 XUTnpblx 11apaJ[neJ11lt.1. OI1TH'ICCKH col1pAXCcl111bIC OTpaiMcaTe1110110C 1Cp:aJ1t) (7) 11 CCJICKTHttt) oTpacaruni.iue JUD! aJIHHM HW)J1tlla 11Cplu)11)))a3cpa (3) . H npcslpa'11t)c 11J1i Juiiini i• 'nun)! Inupoly na3cpa (4) •icpxivit) (8). x0-Tupi.1e pacnono*Cl1w ua oilTHVCCK1tx OCAX ncpl1011) H BTaptm) J1a3Cpon ce)OTDeTCTielnu), ycTaioi icirnlac Ha OI1TH4eCKi)H. ocH' 11TOpOrt) naiepa (4).
- 30 t OtyCHpylo1trylc) CHC CMY (8) It OI1TH'1eCKuC 110at)XIIo (10) C 11aXOHC9PHHKOM (11). .DLIXOH KO TOpOlt) AIURCTCA OirrHllea; HM li IXOHOM yCCpOHCTBa, OrnHHAiCHLICeC) TCM, ann. B Item Bnc acii Tpc rnii NMnyJlf.etlb i J1a3Cp (20), onTH'1 CKWI OCL KoTnpolu i1apaJ1J1U1L1ta unrlivecKHM OcxM. altyx 11pyHX J1aiep01i. yCTallt)IUC110 crrpa*aTCJ11)IOOC 3cpKaJio (21), npH'ICM OTpaWCaTCJ1L11Lic
- 35 3CpKana (7. 21) yCTalrunrCILL1 t: nenM))K11OCTLIO nlaltOlla HX H3 xona H311y4C11HH. It Ha onTH'1eCKOH J1CH BTOpOT) J1aiepa (4) 3a L't;11eKTHHHHAM, 3CpXa11OM (8) yciatiofuleiio BTOpC) C ACKTH11110 oTpa*aTeJ161100 J1IH J1UHH11 110M11L1 TpCTLCrO nalepa (20) H r1pcnpa'latx; Jinx Jutlin ROM! iicpnoru 11 BTOpOH) J1a3CpOB (3, 4) 3cpxaftu (25) nnTH'1ecxll Cortpax:citiuc c urpaxcaTCJ1L111.M 3epKanOM (21) ,
- 40 yCTallonneuuMM 11a onTH'1ecxoil OcH TpeTb.efx) J1111Cpa (20). t}OKyCHpylo1.uct CHCTCMort (9) n ltxOAoM1o1TWleei oro 110noxua (10). paCluono*ciiiu rX 11a Oaf nropopOJ1a3cpa (4). laa iii ilt)ri tri ocei ucplu)IC) 11 1pcTl.cru nalcpun (3. 20) Iioiiei1onaTCJ1L1lin no xoiy 113J1y'1e111H pacucuiio aail.I t n);ycilpylo1mui (12. 22) CHCTCma H of Th'ICCKue HIOJO alo (13. 23) a flaX011e'1111HKOM (14. 24).)lraxuu).1

KOTOpUX AafAIOTC31 ApyrHMH 011TH9CCKHMH BMXOlraMH yCTpOHCTna, cHa6xenHoro **TaXXCCIXOTA** 6m **OAHHM** npHCMHHKOM HH47OpMaUHH (15) o cocTo **HHH.16HOITort19CCKO1iITKaTH!(16)**, **BXOA** KOTOpOpo!CO11pA CH!CMCCTOM 803,\$CrICTBHA Ha 6HOTJCaHb (16), a **BLIXOA cOCAHHcii** c **BXOAOM** 6nox4 yllpaBJICHHA (1), **BbIXOAbI KOTfpCrO** COCAHHCHW C **BXOAOM!**JJICKTpOHb!X xno4e % (5. 6, 26), ycranoMe iiLwx n utnxx cOCAHHCHHA KaRCAOpo na3epa (3, 4. 20) c 6noxoM MiTatIHA (2).

3. Ycrpocpicio no n.1-. 2. oTJ1:I'lalouiteca TCM. TM. npl!CMHHK HH4)OphalaHH (15) o COCTOAHHH **6HOiorH'lecKON** TKaHH (16) Bbinonnci a Brine **CnCKTpOatiaJiu3aTOpa** (27) a **06naCTH** 200 **HM!**- 1500 **HM**, **BXOA/KOTOpOpo** O11TH9CCKH cOnpAJKCH C MCCTOM 1103ACriCraHA Ha (HOTKauil(16). H cocroxlicrO HT aHC11CpCHOIIFlorO JJICMetra (28), nHICHKH ()OTOACTCKTOpOI (29) H 3neMeUTa CpaHHCHHa (30).

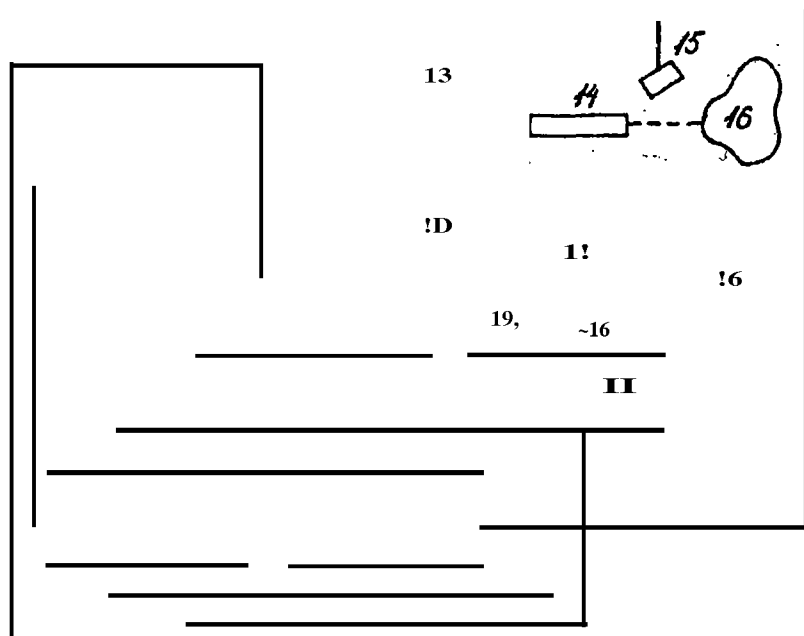
4. YcrpOHCTIy) no n. I, 2. OTJ1H4auOUI000)1 TOM.!'ITO!npltcMHHK HIpOpMalIHH (15) O!cot.'TOAIHki6HtUlt)rlI9CCKoriTKIIHH (1t1) iu.nninic11 n mutt 4)OToinCKTpH4ecKoro **IlpHCMi iKa** (31) Hrrif)paKpaCIIOTO 113Iy4CHHA. **BXOA** KOTOpOpo O11TH'icCKH **COnpAMCCTiIC** MCCTOM!icnhICHCTBnx Ha 6HOTKaHb (16) nocpe cTaoM fonapOTOpo 3epKana (32). pacno.rnn crinoro Ira oni`wi :CKON OCH na,epa (3, 4, 20) Me cny **ifblxmtUIM** 3cpKanOM naicpa (3. 4. 20) H 4-oxycnpyroreic CHCTCMOii (9. 12. 22) . 4epci (1)HR13Tp (33) a filont)coH npOnyCKaiIHR. **HCKn109calollac4** nunaame t'a 1pIICMI K (31) **if3ny4CHHA** nalcpa.

5. YcrpocpI)no no lr. I. 2. czTJ1H'ralo Itcccx TOM. 9TO npHCMHHK HIIitx)pmalHH (15) o cocpOAlitH **6Htwoni'icCKOH** TKIIHH (16) ni.rnoJitien **B** aunt aKyCTH'icCKOI'o !pIICMIHKa (34). yeTallortnenIlorcI TaKHM o6palOM. 'ITO 11allpaluleliHe ell) M.:IKC)Imail moil 'fyncr;HTCnwioclt cocraNIACr C HaripalurelmcM C)nTH4cCKOH!()CH tia nt.txone IlaK011c9tlmKa (11. 14. 24) yron a. **ynOMCT11opXI0IUHH ycnomHlo:** $11^a < a < 86^0$.-

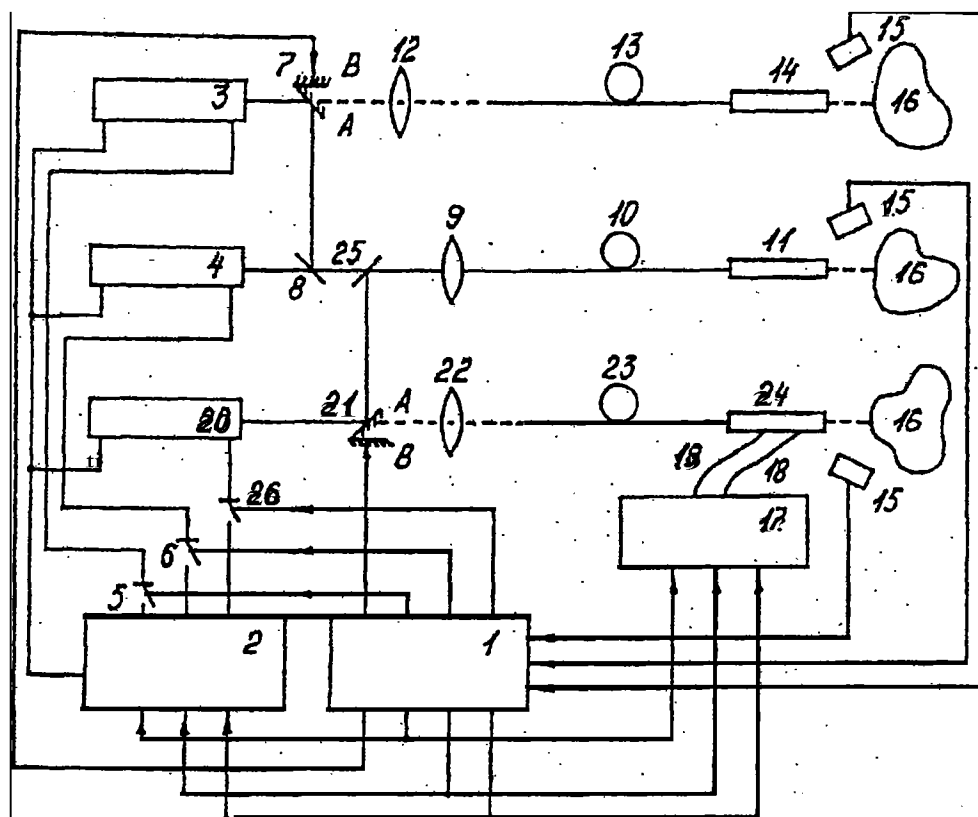
6. YCTpOitmo!no It. 1.2. (rJIH9alO111CCCA TCM, 9TO B.IICKTpOI1rbIii)UUO'I (5, 6, 26) B1.Innni1Cn n **BHAL ilwIynpolu)nlHKnnor** **HMI!9n** eKTpotaKyyMIIIOro I1CpC1CJIJO'IUTCIAI.

7. YCTpOHCTIM) no ii. 1.. 2. crr:IlI'alnuicecs TCM, 9TO olio **AO1cu11IHTCJ1bln** c1ta6mcelto **chCTCMUH** (wirielIHA (17), .coc7ciliilcH **Hi** pcIcpnyapa **IIJIA** 130Afe1 C nourillmM tIacucoM (35) •ti n rinyuuu)ru• **xoollpcccopa** (36). cooTI Tcrnytoluic nmxcmbI (18. 19) xcroplax **t>61.enHulcUb1** li **HaKOIic4IHKaX** (11. 14. 24) H miunnin'CA Hppinarmiuri1i.IMH **BLIXOnaMH** ycrpOHCTBa, a **1M)31iyLI1blII KOMIIPCCCOp** (36) a **MCX.TC cOCA)1iICIUt** c no3UyXOnpwt02aMH (19) cta63,ccIr **Z)ACKTlx)Mat1IHTIILIMH** K.AananaMH (37, 38, 39), **nOAKA104c11IIMH** **aMXOAaM** .6noxu **yripanncitla** (1) 9cpc3!JI IHII **3anCpxtKH** 40, 41.42.

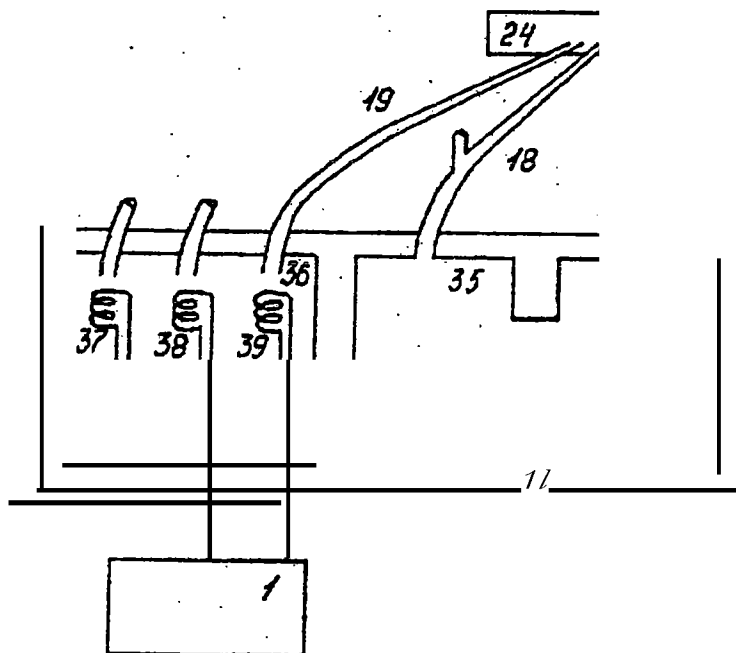
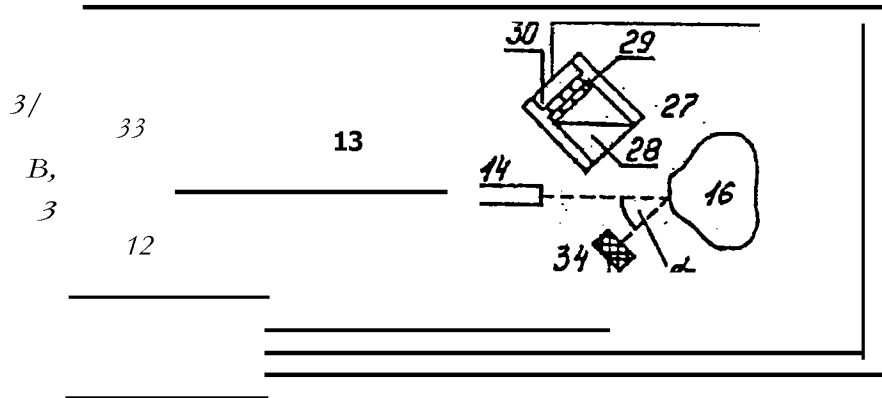
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 $PN_{\mathcal{V}}$

INTERNATIONAL SET. 6. REPORT

International Application No.

PCT/RU95L00211

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: A61N 5/06
Awing to Interim Patent Application (IPC) or to International Classification and PC

B. FIELDS SEARCHED

Minimum documents searched (classification system followed by classification symbols)

IPC6: A61N 5/06, A61B 17/36, A61C 5/00

Documents searched other than minimum documents to the extent that such documents are included in the titles searched

Electronic data base consulted during the international search to the extent that such data base and, where practicable, search engines used;

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication where appropriate of the 'vital' passages	Relevant to claim No.
A	WO, A1, 90/12548 (VASSILIADIS, ARTHUR et al), 01 November 1990 (01.11.90), the description, pages 1, 5-9, Figs. 1-4.	1, 3-7, 2-7
A	EP, A2, 0429297 (HAMAMATSU PHOTONICS K.K.) 29 May 1991 (29.05.91), the description, pages 1-5, Figs. 1-4	1, 3-7, 2-7
A	EP, A1, 0320080 (DIAMANTOPOULOS, COSTAS). 14 June 1989 (14.06.89), the description, pages 1, 4-8, Fig. 4	1, 3-7, 2-7.
A	EP, A1, 0253734 (SOCIETE CIVILE de RECHERCHE "SCR RECHERCHES et DEVELOPPEMENT"), 20 January 1988 (20.01.88)	1, 3-7, 2-7

If the documents are listed in the continuation of Box C.

See patent fondly annex.

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Date of the final completion of the international search

11 January 1996 (11.01.96)

Date of the international search report

23 January 1996 (23.01.96)

Name and mailing address of the ISAJ RU

Authorised officer

Facsimile No.

Telephone No.

INTERNATIONAL SEARCH REPORT

International Application No.

PCVR119vfQ711t

C. (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category:	Oration of document, with Indiatioo, 'Mete appropriate, of the Mtwara puss sea	Relevant to daim No.
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SU, .A,! 4836203! (CARL-ZEISS-STIFTUNG) ,
06! June! 1989! (06.06.89)

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C. 110KymeHTU, C⁶(KTAP)ISHECZ PEAEBATHIMU

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L14R *) Bo3MOzHO. peJeBaHTHuit'aCTel xVHKTY No. 1

1 A WO, A1.90/12546(VASSILIADI:~. ARTH tr et 1.3-7.2-7
al.). 01.Hoar! 1990 (01.11.90. oriH-1
oamme.c.1.5-9.41xr.1-4

A U. A2.0429297 (HAMAMATSU PHOTONICS K.Y.T. 1.3-7.2-7
29!was!1991.129.05.9.1) .onxcreeHe c.1-1.
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A EP.. AL.0320i:060 (DIAMANTOPOTJLOS.COSTAST. 1,3-':.2-7• 1
14 MHR 1969 (14.06.59 ,811dcaH⁸C.C. l.
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A EP. AL.0253734 (OCIE TE CIVILE de!R CHE- 1.3- .2-? !!
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